

CLAIMS

1. An engine protection system for a construction machine, said system comprising revolution speed detecting means (14) for detecting a revolution speed of an engine mounted in the construction machine (1), a plurality of cylinder temperature detecting means (20a-20p) for detecting exhaust temperatures of respective cylinders of said engine, storage means (24, 26) for storing the detected engine revolution speed and the detected exhaust temperatures of the respective cylinders while keeping temporal relationship, and control means (24, 26) for outputting a display signal computed based on the stored data.

2. The engine protection system for the construction machine according to Claim 1, wherein said control means (26) includes trend data processing means for extracting, from the stored data, the exhaust temperature of each cylinder at a predetermined engine revolution speed, computing at least one of an average value and a standard deviation of the exhaust temperature of each cylinder per a predetermined time based on the extracted data, producing and storing trend data representing time-varying changes of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, and outputting a display signal for displaying the produced trend data to the outside of the construction machine (1).

3. The engine protection system for the construction machine according to Claim 1 or 2, further comprising a

display unit (23) disposed in a cab (5) of the construction machine (1), wherein said control means (24) includes snapshot processing means for producing and storing snapshots extracted from the stored data within a predetermined time in accordance with a command from an operator, and outputting, to said display unit (23), a playback display signal for playing back and displaying progression of the stored snapshots in accordance with a command from the operator.

4. The engine protection system for the construction machine according to any one of Claims 1 to 3, further comprising first abnormality determining means (17') for determining whether a deviation of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, which are computed per the predetermined time, from corresponding one of an average value and a standard deviation of the exhaust temperatures of all the cylinders is larger than a predetermined threshold, and outputting an abnormality signal when the deviation is larger than the predetermined threshold.

5. The engine protection system for the construction machine according to any one of Claims 1 to 3, further comprising second abnormality determining means (17'') for determining whether a deviation of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, which are computed per the predetermined time, from corresponding one of an average value and a standard deviation of the exhaust temperatures

of all the cylinders is larger than a predetermined threshold, and determining a kind of abnormality and outputting an abnormality signal when the deviation is larger than the predetermined threshold.

6. An engine protection method for a construction machine equipped with a multi-cylinder engine, comprising the steps of storing an engine revolution speed detected by revolution speed detecting means (14) and exhaust temperatures of respective cylinders detected by a plurality of cylinder temperature detecting means (20a-20p) while keeping temporal relationship, and outputting a display signal computed based on the stored data to display means (23).

7. The engine protection method for the construction machine according to Claim 6, further comprising the steps of extracting, from the stored data, the exhaust temperature of each cylinder at a predetermined engine revolution speed, computing at least one of an average value and a standard deviation of the exhaust temperature of each cylinder per a predetermined time based on the extracted data, producing and storing trend data representing time-varying changes of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, and outputting a display signal for displaying the produced trend data to the outside of the construction machine (1).

8. The engine protection method for the construction machine according to Claim 6 or 7, further comprising the steps of producing and storing snapshots extracted from the stored data within a predetermined time in accordance with a

command from an operator, and outputting, to the display unit (23) disposed in a cab (5) of the construction machine (1), a playback display signal for playing back and displaying progression of the stored snapshots in accordance with a command from the operator.

9. The engine protection method for the construction machine according to any one of Claims 6 to 8, further comprising the steps of determining whether a deviation of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, which are computed per the predetermined time, from corresponding one of an average value and a standard deviation of the exhaust temperatures of all the cylinders is larger than a predetermined threshold, and notifying an abnormality when the deviation is larger than the predetermined threshold.

10. The engine protection method for the construction machine according to any one of Claims 6 to 8, further comprising the steps of determining whether a deviation of at least one of the average value and the standard deviation of the exhaust temperature of each cylinder, which are computed per the predetermined time, from corresponding one of an average value and a standard deviation of the exhaust temperatures of all the cylinders is larger than a predetermined threshold, and determining a kind of abnormality and notifying the abnormality when the deviation is larger than the predetermined threshold.